GUIDE TO

THIRTY-FIRST ANNUAL FIELD CONFERENCE

OF THE

SECTION OF GEOLOGY

COMBINED WITH THE SECTIONS

OF PLANT SCIENCE AND CONSERVATION

OF THE

OHIO ACADEMY OF SCIENCE

APRIL 21, 1956

THE NATURAL ENVIRONMENT

OF THE

SPRINGFIELD AREA

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John Melvin, Geology

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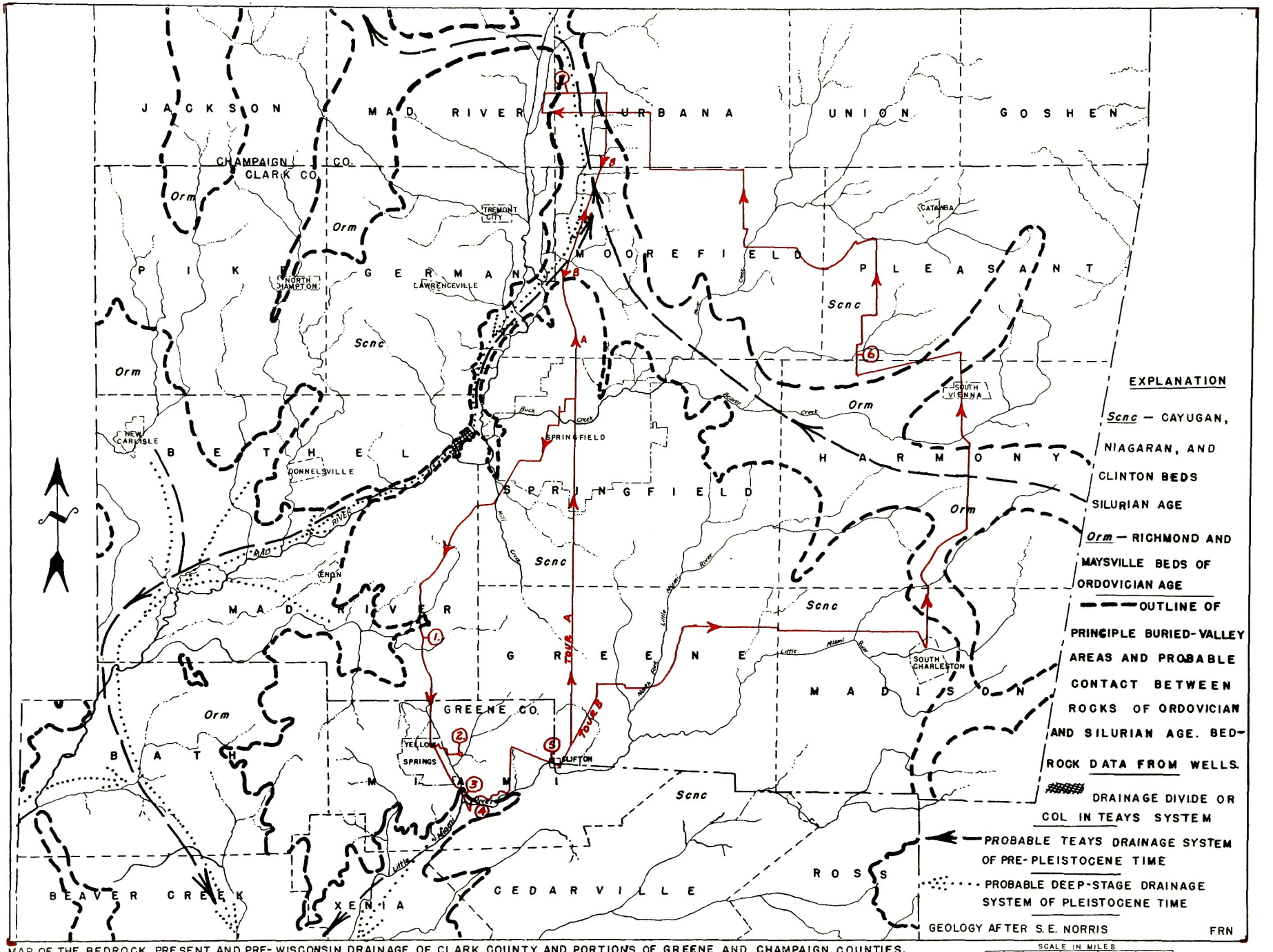
GEOLOGIC COLUMN

The following chart shows that part of the geologic column of Ohio that might be expected in Clark County and adjacent portions of Greene and Champaign Counties.

SYSTEM	GROUP	FORMATION	DESCRIPTION	THICKNESS (Feet)
Quaternary	Pleistocene series	Middle Wisconsin drift	Ground and end moraine, outwash, kames, and valley-train deposits	0 to 60
		Early Wisconsin drift	Extensive gravel outwash and kames	5 to 200
		Pre-Wisconsin drift	Mostly fine sand filling buried valleys. Perhaps some till.	0 to 400
Silurian	Niagaran	Cedarville dolomite	Massive, porous, dolomitic limestone	5 to 150?
		Springfield dolomite	Thin-bedded and dense	10 to 15
		Euphemia dolomite	Massive and porous	6 to 8
		Massie shale	Calcareous and dense	4 to 5
		Laurel dolomite	Thin-bedded and dense	5
		Osgood shale	Calcareous with limestone beds	20 to 25
		Dayton limestone	Thin-bedded and dense	6 to 8
	Beds of Clinton age	Brassfield limestone	Fossiliferous, massive to irregularly bedded	30
Ordovician	Richmond, and Maysville		Shale, soft, calcareous, interbedded with thin hard limestone layers; called the Cincinnati shale in old reports	1,000+



EXPLANATION

Scnc — CAYUGAN, NIAGARAN, AND CLINTON BEDS SILURIAN AGE

Orm — RICHMOND AND MAYSVILLE BEDS OF ORDOVICIAN AGE

OUTLINE OF PRINCIPLE BURIED-VALLEY AREAS AND PROBABLE CONTACT BETWEEN ROCKS OF ORDOVICIAN AND SILURIAN AGE. BEDROCK DATA FROM WELLS.

DRAINAGE DIVIDE OR COL IN TEAYS SYSTEM

PROBABLE TEAYS DRAINAGE SYSTEM OF PRE-PLEISTOCENE TIME

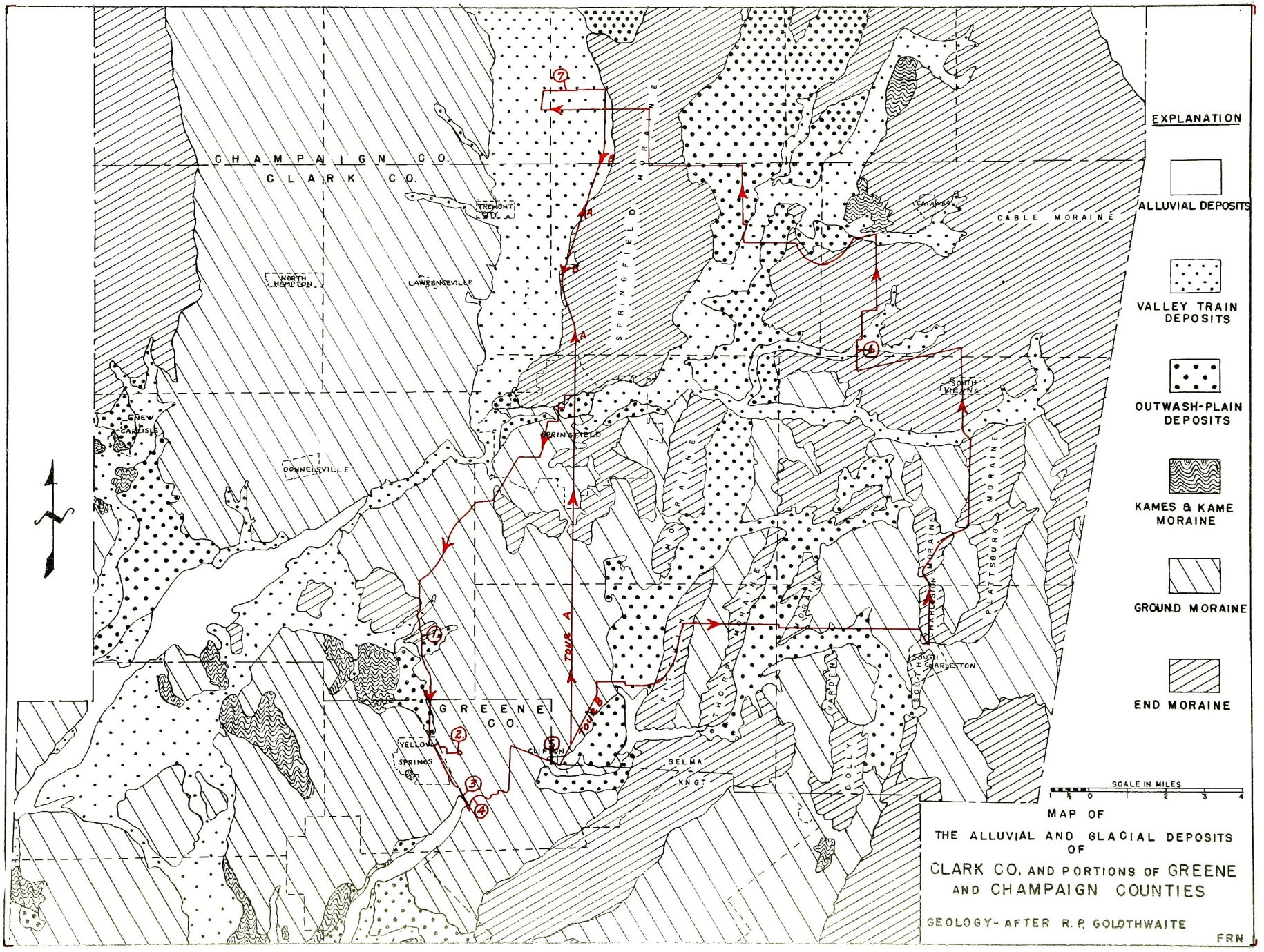
PROBABLE DEEP-STAGE DRAINAGE SYSTEM OF PLEISTOCENE TIME

GEOLOGY AFTER S. E. NORRIS FRN

SCALE IN MILES

½ 0 1 2 3 4

MAP OF THE BEDROCK, PRESENT AND PRE-WISCONSIN DRAINAGE OF CLARK COUNTY AND PORTIONS OF GREENE AND CHAMPAIGN COUNTIES.


CHAMPAIGN CO.
CLARK CO.
GREENE CO.
TREMONT CITY
NORTH HAMPTON
LAWRENCEVILLE
SPRINGFIELD
DONNELSVILLE
NEW CARLISLE
YELLOW SPRINGS
CLIFTON
SELMA KNOT
TRUE A
TO B
CABLE MORAINE
EATAMBO
SOUTH VIENNA
SPRINGFIELD MORAINE
PLATTSBURG MORAINE
PORTAGE MORAINE
THORPE MORAINE
GARDEN
POCKET
SOUTH CHARLESTON
EXPLANATION
ALLUVIAL DEPOSITS
VALLEY TRAIN DEPOSITS
OUTWASH-PLAIN DEPOSITS
KAMES & KAME MORAINE
GROUND MORAINE
END MORAINE
SCALE IN MILES
½ 0 1 2 3 4
MAP OF
THE ALLUVIAL AND GLACIAL DEPOSITS
OF
CLARK CO. AND PORTIONS OF GREENE
AND CHAMPAIGN COUNTIES
GEOLOGY- AFTER R. P. GOLDTHWAITE
FRN

Saturday, April 21, 1956

The emphasis on this field trip will be on the inter-relationship of the three fields rather than on the detailed study in any particular field. The Tour Committee hopes the program will afford a unified view of the whole scene, from geological origins to the problems of human use.

Meeting Place (assemble at 8:00 A.M., leave at 8:15 A.M.)

The field trip party will assemble in front of Blair Hall. The buses will depart promptly at 8:15 A.M. and proceed south on Wittenberg Avenue. The zero mileage begins at the north end of the Wittenberg Avenue bridge.

The Wittenberg Campus is located on the southern edge of the Springfield moraine. Descend to outwash deposits at the campus entrance.

00.0	North end of the Wittenberg Avenue bridge. Note the steep cliff made by the massive Cedarville dolomite exposed along Buck Creek. The thin bedded Springfield dolomite can be seen at the base of the cliff.
.2	Turn right on West North Street. Now traveling on ground moraine.
.4	Turn left on Yellow Springs Street.
2.0	Turn right on Innesfallen Road.
2.6	Turn left on Rebert Pike.
3.3	Cedarville dolomite exposed in stream valley on the right. Ground moraine very thin.
6.4	Turn left on the Tecumseh Road.
7.1	Descend off ground moraine through bedrock to the valley-train deposit of Mud Run.
7.7	Ascend patch of end moraine.
7.9	Turn right and immediately left continuing on the Tecumseh Road.
8.2	STOP I Keiffer Gravel Pit

Length of time of stop: 35 minutes

Keiffer Gravel Pit on Fairfield Rd. 991' Corner

This spot is in the discontinuous line of the Springfield Moraine. This moraine consists of series of hummocky areas and sharp kame groups, mapped by Brown and Goldthwait, which seem to tie to Leverett's Camden Moraine at Dayton. In any case, the stone counts in this area (10% crystalline Canadian rocks, over 10% limestones but less than 80% dolomites) accord with those for Miami lobe advance. Such drift is found for 8 miles east of here where it butts against dolomite rich (over 80%) till of the Scioto lobe and the eastward curving Thorp-Xenia-inner Cuba Moraine.

The section here is typical of the region:

3 to 9 ft. of till (Middle Wisconsin?) covering a rolling surface on underlying sand-gravel topography. Contains chunks of the "soil" buried beneath it. Till is calcareous (not leached) where more than 5 feet thick and carries an extra-red 36-inch-deep soil profile due to the good underdrainage.

0 to 2 ft. of dark reddish brown "paleosol" developed in the underlying sand and gravel. This "buried soil" was similar to the very irregular Fox soils today, but only the deep pendants of clay-rich, leached B-2 material escaped removal by the glacier. In many parts of this quarry, it is wholly absent (scraped off?).

60 feet or more of bedded sands and gravels (early Wisconsin?) similar to those found under more than 200 square miles of till-covered area from 5 miles east of Springfield to on the west edge of Dayton, and from Xenia to Bellefontaine. In some places, as in high kames one mile southwest, the overlying till is thin or absent, and foreset structure indicates shifting currents in several directions and ice-contact relations.

Bedrock, Niagaran limestone, is 20 to 30 ft. below the pit as indicated by test diggings and a well at this level north of Fairfield Rd.

Critical questions today here as elsewhere are:

Is this truly a buried soil which is only partly removed by over-riding ice? If so, what long warm soil-forming period does it denote? mid Wisconsin? pre Wisconsin but post Sangamon? or Sangamon?

In seeking answers to these at this typical section, note that (1) the horizontal nature of the paleosol and inclusions of it in overlying till suggest it is a soil; (2) the lack of A-zone top soil and clay filled joints in thin till above in some

places suggest it may be postglacially developed by groundwater; (3) deepest portions of paleosol indicate well-developed clays but not similar to the very old Sangamon soils exposed south of the Wisconsin border; (4) radiocarbon dates in the upper till nearby indicate that the cover dates from fairly early traditional Wisconsin (21,000 years ago), which is Bloomington in Illinois; and (5) gravels are not as deeply silted nor as heavily indurated as many known Illinoian gravels further south.

Continue south on Tecumseh Road. Traveling over ground moraine.

8.6 Hills and knolls in distance to the right are gravelly kames.

8.8 On the right is an example of failure of reproduction in a woodlot because of grazing.

9.8 Leave Clark County - enter Greene County.

10.3 The original Yellow Springs well field which until recently was the sole supply of water for the village. These wells are approximately 115 feet deep and have their source of supply at the base of the Brassfield limestone. This source was found to be inadequate for the rapidly growing community, and new wells were developed in the Little Miami Valley south of town. (See Stop III)

10.8 Enter the village of Yellow Springs.

11.1 Turn left on Dayton Street and proceed across railroad tracks to Highway 68. Turn left on highway for .2 of a mile and turn right on Clifton Road.

11.6 Turn right into Glen Helen, outdoor education property of Antioch College. Proceed for .1 of a mile and turn left on Old Stage Coach Road.

12.1 STOP II Antioch School Camp

Length of time of stop: one hour and 35 minutes

Leave buses for a walking tour of Glen Helen. Meet buses at Trailside Museum after the completion of this tour.

Antioch College School Camp

Among public schools many are interested in moving classes for a week into a camp environment where natural science and conservation can be studied realistically, and where democratic group living can be effectively practiced.

Antioch College is building at this site an all-weather camp facility, largely through student volunteer labor. It will accommodate forty pupils this fall, and eventually eighty

pupils, with teachers and counselors. The camp may also be leased for workshop and conference use by other groups with interests related to the natural environment of the camp.

This site is a former pasture, now in an early stage of forest invasion. The users of the camp will have the opportunity through resource management projects to develop its ecological and aesthetic values. Near at hand is the mature forested portion of Glen Helen which is maintained as a nature preserve.

Route in Glen Helen from the School Camp to the Trailside Museum

Vegetation

This portion of Glen Helen is now a two-aged forest, with many survivors of the original oak-hickory climax. Since grazing ceased in the property some thirty years ago a vigorous sapling growth has developed of maple, ash, basswood, walnut, etc.

Southwest of the Birch Creek bridge an area of locust and cherry fills the site of an Owenite colony abandoned about 1830.

Above the Yellow Spring the widespread white oaks seem to indicate an oak opening in the original forest. Native shrubs have been planted here to prevent intensive trampling and run-off.

Flowering along the route at this season are redbud, trillium, anemone, mayapple, violets, wild ginger, Jack-in-the-pulpit, columbine, phlox, cranesbill, and waterleaf.

Stratigraphy

The formations exposed along the valley of Birch Creek belong to the Niagaran and Clinton groups of the Silurian system. The Brassfield limestone is the lowermost Silurian formation, below which lies the Richmond and Maysville groups of the Ordovician system.

Cedarville Dolomite

The Cedarville dolomite is the uppermost formation of the Silurian system in this area. This formation is a gray, massive, porous, dolomitic limestone. It characteristically exhibits an excessively pitted, weathered surface. In the past, it has been extensively quarried and burned for lime in this locality. It is still quarried in smaller amounts. Its thickness along Birch Creek is 8 feet.

Springfield Dolomite

The Springfield dolomite lies immediately below the Cedarville. It is characterized by thin beds of gray to yellow

dolomitic limestone, with gray, shaly partings. It can easily be distinguished from the overlying Cedarville by its well developed joint system and thin beds which make it less resistant to erosion. The impervious shaly partings of the Springfield cause percolating ground water to move laterally, forming a local spring zone at the top. This spring zone, plus the formations lesser resistance than the overlying Cedarville, contributes to the formation of the conspicuous undercut that is generally present wherever these two formations outcrop. Its thickness here averages 6 to 7 feet.

Euphemia Dolomite

The Springfield dolomite is underlain by the massive or thick and uneven bedded Euphemia dolomite. This formation in most places outcrops as a prominent cliff face due to its greater resistance. It is porous and buff-colored. Thickness - 7 feet.

Massie Shale

Underlying the Euphemia dolomite is the Massie shale which is a very thinly bedded, calcareous, dense, gray shale. This formation is important locally as a spring zone. The volume of Birch Creek is appreciably increased downstream from the Massie exposure. The well at the Antioch School Camp has been drilled to this horizon. Its thickness here is 5 feet. The Massie is the lowermost formation exposed in this portion of Glen Helen.

Yellow Springs

At the base of the Yellow Spring the largest travertine deposit of the local area has been formed. The mound has developed to a height of seventy-five feet and has a basal diameter of over five hundred feet. The travertine is composed of approximately 85 per cent calcium carbonate and its bright orange-red color is due to an additional 6 per cent iron oxide. The remaining material is primarily made up of organic remains in various stages of decomposition.

The spring issues forth from the Cedarville dolomite probably close to the top of the Springfield formation. It is thought that a clay lens or layer deflects the water horizontally. The rate of flow is between 60 and 80 gallons per minute. The spring at one time in its early history furnished Antioch College with its water supply.

The late Professor A. C. Swinnerton made careful studies of the mound as to dimensions and rate of deposition. At the present rate of deposition, it has been roughly calculated that it would have taken over 40,000 years for the mound to reach its present dimensions. It is more than likely, however, that the rate was more rapid in the past.

Birch Creek Flood Evidence

During the afternoon of June 5, 1954, the local area received four to five inches of rain during a two hour period. The runoff was excessive and the local creeks increased in volume severalfold. Many bridges were washed out and a great deal of material was washed down stream. The course of Birch Creek changed slightly in places and a great deal of debris has been rearranged. Large glacial erratics and underlying bedrock fragments of several feet in diameter were carried downstream for distances of hundreds of feet indicating its greater than normal velocity and volume.

00.0 Board buses and leave Trailside Museum. Turn left on Corry Street. Entrance will mark new zero mileage.

.5 Turn left on Grinnell Road and descend onto the recent alluvium of the Little Miami Valley. Here ground moraine covers the bedrock but the conspicuous flat bench near the bottom of the hill is underlain by the Brassfield limestone. Richmond shale (Ordovician) underlies the recent alluvium.

1.7 **STOP III** Little Miami Valley

Length of time of stop: 5 minutes. Remain in buses.

The Little Miami Valley includes the southern half of Glen Helen. A part of the valley is used for the Glen farm whose income helps support the educational and recreational aspects of the Glen. The ground water resource of the valley is important to the local area. The new well field of the Yellow Springs village is here as well as a community well for an outlying residential development. The water is derived from the edge of a buried glacial valley which terminates a few hundred yards down stream and widens considerably several miles farther on.

1.9 Notice the old Grinnell Mill on the right at the turn. This mill is one of the two that still stand out of the many that existed along this stream in the past.

Turn left on Bryan Road. Bedrock is covered by soil and vegetation. Occasional Brassfield boulders can be seen near base of hill.

2.3 Horace Mann Monument in clearing on right.

Horace Mann, promoter of public school education in America, is commemorated here on land that he owned when the first president of Antioch College.

Today this statue is central to a contiguous group of outdoor education and recreation properties totaling 1800 acres in the upper Little Miami watershed: Bryan Park, Glen Helen,

Camp Birch (Boy Scouts), Camp Greene (Girl Scouts), Camp Clifton (4-H), and Camp Cooper (O.S.S.O. Home).

The monument is the gift of Hugh Taylor Birch, who acquired and donated Glen Helen, Camp Birch, and a portion of Bryan Park.

2.4 **STOP IV** Yellow Springs School Forest

Length of time of stop: 30 mintues

Since 1947 this 100 acres of Glen Helen has been operated by the Yellow Springs Schools as a School Forest. It was dedicated in 1949 by the Ohio Forestry Association, the first of fifteen School Forests in Ohio so recognized.

It includes a 40-acre plantation set out around 1926 by the Ohio Division of Forestry on land then severely eroded. In 1948 thinning began on a 6-acre pine stand in this area, providing pine tops for an annual community Christmas Tree Festival. Meanwhile the children have planted another 16 acres of pines, spruce and Douglas fir, setting out some 2000 seedlings each spring. The thinning is now completed and last Christmas the schools received nearly $500.00 for Christmas trees selected from their own plantings.

2.6 C.C.C. camp on right. Used when Bryan Park was developed.

2.8 Turn right into John Bryan State Park.

Most of this Park was once a farm owned by John Bryan, who is credited with pioneering the use of alfalfa in this region. He willed the land to the State on condition that "no religious assemblies shall be held," but this restriction was set aside as a violation of free speech. The Park was landscaped and planted by the Division of Forestry, and now is operated by the Division of Parks. The picnicking areas still have magnificent trees which Bryan had preserved.

North of the Park boundary on the left is Camp Birch, a Boy Scout property. Originally a grazed woodlot surrounded by fields, it now is beautiful with natural plantings and a small lake.

These properties illustrate the restoration of natural settings for purposes of outdoor recreation and education despite the seeming lack of such opportunity in western Ohio.

3.0 Turn right into parking lot for lunch and rest stop.

Lengh of time of stop: 1 hour

After lunch stop, board buses to resume trip. Turn right out of parking lot.

3.1 Turn left on Park Drive. Driving over ground moraine between here and Clifton Gorge.

4.8 On right are recent plantings by the Division of Forestry.

4.9 Turn left on Swimming Pool Road.

5.0 Camp Birch on left.

5.8 Turn right on Clifton Road.

6.7 Turn right into parking lot at Clifton Gorge.

STOP V Clifton Gorge

Length of time of stop: 1 hour and 30 minutes.

Geology

Early Geologic History

The sediment that was to form the bedrock underlying this area was deposited on the bottoms of the vast inland seas that covered southwestern Ohio some 350 to 400 million years ago. The rocks exposed in the Clark-Greene County area belong to the Ordovician and Silurian systems. These rocks have a slight regional dip of a few degrees in a northeasterly direction because of their location on the east flank of the Cincinnati Arch. This broad arch or anticline trends in a north-south direction and is the major structural feature of Ohio. Only the Cedarville and Springfield dolomites will be generally visible in the small portion of the gorge to be seen on this tour. The Little Miami has cut itself through rocks below these two formations farther downstream but exposures are few because of rubble, soil, and vegetation cover.

Notice that the massive Cedarville is much thicker here in the gorge (averages 50 ft.) than it was at Glen Helen (averages 8 ft.). This is due to greater erosion at the Glen Helen area which lies nearer the axis or center of the broad fold.

Pleistocene History

Whereas the form of the gorge is controlled by the rock stratigraphy, some of the length and the great potholes in the rocks high on either side, are due to glacial conditions. At one stage in melting of thick ice (probably early Wisconsin) all the meltwater from ice over Miami, Mad River, and tributary basins had to pour south through this gorge. Mad River and the Miami River Valley must have been filled by ice for the Kennard Outwash 33 miles long and 1 to 4 miles wide extends all the way from Logan County (Piatt Castle) south to Clifton Gorge. It is broken by present east-west creeks (as at Stop VI) and covered here and there by thin till but its slope is

regular 8 ft./mi. at the upper (northern) end to 4 ft./mi at the Clifton (southern) end. It is possible that even the waters depositing kames all around the Bellefontaine area came this way. Anyway, the drainage was tremendous and concentrated in summer floods. The corroborating evidence here is the giant potholes 2' to 8' across even on ledge surfaces above the gorge and south of it in the woods.

Botany

Trail Trip - Clifton Gorge

Above the rim of the gorge are found the well-drained upland areas. These are covered by a growth of grasses and other plants reminiscent of the prairie openings which they doubtless once constituted. This well-drained area is covered by an overburden of glacial gravels. The massive rock exposed at the brink of the gorge is the Cedarville dolomite. Below it lies the stratified Springfield dolomite.

Entering the gorge by the winding trail, a contrast is noted between the exposed north side of the gorge and the shaded south side. The latter side warms up slowly in the spring and the vegetation develops about two weeks later than that of the north side. In late winter the Scarlet Cup Fungus (Sarcoscypha coccinea) appears in quantity under the leaves.

The Cedarville dolomite shows marked pittings due to differential hardness and the resultant uneven weathering. Two ferns occupy these pockets in the rock face. These are the Bulblet Fern (Cystopteris bulbifera) and the Purple Cliff Brake (Pellea atropurpurea.) Another common resident of the cliff face is the Columbine (Aquilegia canadensis).

Habitats to be noted on the gorge walk include, (1) the sheer dolomite walls already referred to, (2) the talus slope with a considerable number of rock fragments, (3) the larger fallen rocks, mostly moss-covered, and, (4) the water edge habitat along the Little Miami River.

Leskea polycarpa is one of the commoner mosses covering the rocks in the gorge. Besides the two ferns already mentioned, we find the Walking Fern (Camptosorus rhizophyllus) on the moss-covered rocks, the rather abundant Maidenhair Spleenwort (Asplenium trichomanes) and, growing solitary, a few specimens of the rare Wall-Rue Spleenwort (Asplenium cryptolepis).

Worthy of note among the gymnosperms here are, the American Yew (Taxus canadensis) on both the north and south cliffs; the Arbor Vitae (Thuyaoccidentalis) and the Hemlock (Tsuga canadensis). On the upland openings are numerous Red Cedars (Juniperus virginiana). Herbaceous plants are too numerous to list here. Shrubs include the Spice-bush, Bladdernut, Red Bud, Flowering Dogwood, Witch-hazel, Smooth Hydrangea and Service Berry. Of special interest are such species as the Red

Elderberry and the Mountain maple. These two are relic plants of the Ice Age, having survived here because of the coolness of the gorge. Among the varied flora of trees are several oaks, slippery elm, black walnut, butternut, hackberry, sugar maple, sycamore, hop hornbeam, Ohio buckeye, tulip poplar, blue ash, basswood and many others.

Geography

Influence on Human Occupance

The gorge has played an important part in the history and settlement of this area. It has exerted a powerful compelling force, and, in one respect, acted as a barrier to early communications. In the days of the stage coach, crossing the gorge was impossible except at certain points along its course. The gorge ran directly across the stage route from Xenia to Springfield (part of the Columbus-Cincinnati run) and posed a formidable barrier. The crossing was made near the present swimming pool and then the route followed the northern rim of the gorge eastward into Clifton. It is significant to note that Clifton has grown and expanded only along the north side of the stream.

The compelling attraction was the potential power in the fast, narrow, and easily dammed stream. In the early days, water power was an important site factor. First, saw mills utilized this power to clear the forest and make available lumber for construction of dwellings and farm buildings, and then grist mills to grind the grain of the early farmers. Eventually, other mills which utilized large amounts of power, such as paper and textiles, were established. A great number of the villages, towns and even cities in our country had their early beginnings in a favorable mill site.

As early as 1802, the first mill was built which served as the locating point and nucleus of Clifton. In fact, Clifton was was first known as Davis Mills. The mills were a point to which settlers of the hinterland brought their wood to be sawed and grain to be milled. At this point of convergence it was only logical to establish trading posts and general stores. Later, the coming of the stage coach along the northern rim added additional stores and inns and gradually a village evolved.

In the 1830-1860 period, Clifton was a thriving community of over 300 people. There were at least five grist mills grinding the local grain and supplying several distilleries with raw materials; a saw mill upon which a furniture and copper shop were dependent; a large textile mill which was established early enough to supply shirts for the soldiers during the war of 1812; and an important paper mill. All these industries and the consequent agglomeration of people were dependent upon the power generated by the Little Miami in its gorge-like valley.

Later with the development of coal and petroleum, the static water power factor became less important. Today, there is but one grist mill which operates sporadically. The former large mills are no longer a part of the present day landscape. However, along the sides of the gorge, the relics of the humming mills of a bygone day can still be seen.

Clifton has not had the advantage of rail transportation which gradually replaced the stage coach, and its consequent boost so important in the late 1800's. With small water power sites becoming unimportant, the village has declined somewhat in size and its function has complete changed. However, its location and early development were decidedly influenced by the gorge of the Little Miami.

FIELD PARTY NOW DIVIDES INTO TOUR "A" AND TOUR "B"

TOUR A - This tour will proceed directly to Cedar Swamp, a natural preserve administered by the Ohio State Museum.

TOUR B - Features (1) glacial geology and (2) the site of Clark Lake of the Division of Wildfire.

For the benefit of people who must leave early Tour "A" bus will stop at Wittenberg College before going on to Cedar Swamp.

TOUR A - CEDAR SWAMP

Cedar Swamp is situated about 4 1/2 miles SSW of Urbana, Ohio in Sections 31 and 32 of Urbana Township, Champaign County. It once covered a large area but is now restricted to a few hundred acres along Cedar Run. About 100 acres is owned by the State of Ohio and administered by the Ohio Historical Society. Of this tract, about one half is bog and one half swamp forest.

The "swamp" contains the only arbor vitae bog in Ohio, a northern relict bog, with many rare, northern bog plants, such as dwarf birch, shrubby cinquefoil, poison sumac and speckled alder. There are many plants characteristic of alkaline or marl bogs, such as fringed gentian, showy lady-slipper, small yellow ladyslipper and tuberous Indian-plantain. The bog also has an element of plants and insects of the Atlantic Coastal Plain, which are believed to have migrated into the Great Lake region in post-glacial times. There is a considerable element of prairie vegetation from the west.

The swamp forest is characterized by American elm, black ash, red maple, basswood and tulip poplar, the last species being noteworthy for so far north in western Ohio.

TOUR B

6.7 Turn right out of parking lot on Clifton Road.

7.2 Turn right (Village of Clifton).

7.4 Turn left. Note old Preston Mill on right.

7.5 Turn left on Highway 72. Traveling over thick ground moraine.

8.4 Turn right on Old Clifton Road.

9.0 The flat expanse to the right in the valley of the North Fork of of the Little Miami is an outwash plain deposited by the stream from the north that was responsible for cutting the major portion of Clifton Gorge. Recent alluvium lines the the present stream. A high water table (reducing conditions) forms characteristic dark soil on these outwash deposits.

10,2 Turn right on Jackson Road. Descend from higher ground moraine to Kennard outwash plain. Nursery on right utilizing dark soils.

11.7 Bridge corssing the North Fork of the Little Miami. This is a State Division of Water gaging station.

11.8 The marked topographic change ahead is due to Pitchin moraine. This is the first end moraine of the western Miami lobe of the glacier. Stone counts taken contain high percentages of dolomite characteristic of Miami lobe deposits. Route continues to north on crest of moraine.

12.7 Grazed woodlot shows lack of reproduction.

13.3 Pitchin Village

13.7 Turn right on Old Springfield Road.

13.9 Descend to thinner ground moraine.

15.2 Ascend onto the Thorp moraine which is the first end moraine of the eastern Scioto lobe. Stone counts here contain high percentages of limestone, characteristic of the Scioto lobe deposits.

15.6 Topographic change marks descent onto outwash plain deposits.

16.6 The Dolly Varden moraine -- the second Scioto lobe end moraine.

17.3 Slight topographic drop to thick ground moraine. At 18.5 miles continuity of ground moraine is broken by small arm of outwash which continues for one half mile.

19.7 Turn sharp left on Buena Vista Road and continue north on crest of South Charleston moraine. The third end moraine of the Scioto lobe.

21.8 Turn right on Highway 54.

22.9 Topographic sag of ground moraine between end moraine. End moraine ahead is the Plattsburg moraine -- the fourth Scioto lobe moraine.

23.6 Turn left on Lisbon Road. For the next 1.3 miles route continues along western margin of the Plattsburg moraine. To the right is the crest of the Plattsburg moraine and to the left is the lower ground moraine. In the distance to the left is the northern extension of the South Charleston moraine. For approximately the next 1.3 miles the route traverses the pre-Pleistocene Teays river channel. Here the bottom of the channel is approximately 500 feet below the surface.

23.9 Enter the village of Plattsburg.

24.7 Descend to valley train deposits along Beaver Creek.

25.1 Beaver Creek. The higher topography to the north (ahead) is end moraine. This moraine, called the Cable moraine is a a very broad continuous moraine formed by the coalescing of the various definite topographic ridges to the south.

26.1 Cross Highway 40 through the village of South Vienna.

27.4 Turn left on the Old Columbus Road. The valley to the right is that of the south branch of Sinking Creek which is part of the watershed for the proposed Clark Lake.

30.2 Turn right on the Vernon Asbury Road.

30.6 STOP VI Site of Clark Lake

Length of time of stop: 30 minutes.

Pleistocene History

The glacial drift here is 200' deep on the edge of the buried main Teays-Deep Stage Valley. Presumably, at Harmony, 2 mi. south (Highway 40), it is over 550' to bed rock! This sharp valley extends northwest under our next and last stop. Thus far our knowledge of glacial history is unravelled from a few tens of feet of surface drift and we do not know whether the fine sands filling the deep valley result from Kansan glacier? Illinoian glacier? Lake Tight? or what.

This is near the western edge of the 8-mile broad Cable moraine. Stone counts (over 80% dolomite, less than 10% limestone or 2% Canadian crystallines) indicate it was put down by the Scioto lobe rather than Miami lobe (Springfield moraine 4 mi. west has less than 80% dolomite, over 10% each limestones and crystallines). This means that Cable moraine is not an interlobate moraine, truly, but the compound lateral moraine of Scioto lobe all the while that Reesville, Glendon, Esboro,

Bloomington, and London moraines and intervening recessions took place. Although individual moraine lines are broken by the valley of this creek and Beaver Creek to the south, this spot is about the extension of the crest of Reesville moraine into the mass of ridges which make up Cable moraine; a 3-mile long gravel-till ridge just north and west may mark the ice edge in "Reesville" time.

Very recent work to the south indicates that this is the outermost end moraine of the late readvance (Middle Wisconsin) of Scioto ice which overran logs now 20,000 to 23,000 years old in the till near Columbus. Apparently this Scioto lobe advance met the Miami lobe just west of here for thin sheets of till extend from Springfield moraine out over the 2-mile broad Kennard outwash. This simultaneous advance of Miami lobe put down the till covering the soil at Stop 1 and pushed down logs dated at 23,600 in Sidney or 21,000 near Dayton.

If the stratigraphy has been properly related (till over soil on gravel on earlier till, all the same in central Ohio), this means that much of the bulk of the underlying Cable moraine and all of the Kennard outwash belt to the west (discussed Stop V) was put down by earlier Wisconsin ice or possibly pre-Wisconsin ice.

Historical Facts

After about fifteen (15) years of diligent search by the Ohio Division of Wildlife, Department of Natural Resources, and the citizens of Clark County, the Sinking Creek area has been purchased by the Division of Wildlife for the purpose of building Clark Lake. This site is about eight (8) miles east of Springfield, near the junction of Old Columbus Pike and the Vernon Asbury Road.

Physical Facts

The eleven hundred foot earthern fill dam will be situated about three hundred feet east of the Vernon Asbury Road.

The water area of this proposed lake will approximate 110 acres with an estimated average depth of approximately five feet. The maximum depth will be about fifteen feet at the dam site.

This lake site is located in an area which was greatly affected by the late Wisconsin glaciation. It will be fed by a heavy spring flow. Being located in the headwaters of Sinking Creek it will also be supplied with water from run off of about 3500 acres.

Recreational Aspects

This proposed lake is located in a heavily populated section of Ohio. Its location is within easy reach of Dayton, Springfield, Columbus and other metropolitan areas.

While being constructed for fishing and its allied recreational aspects, plans are being completed for parking areas and picnic sites with safe drinking water and sanitary facilites.

While the present law precludes the use of motor boats on such limited water areas, row boats, sail boats and canoes meet with the popular approval of both the fisherman and those who desire to just boat ride.

There is reason to believe that some upland game and waterfowl hunting can be had on this area, which would further enhance it its value.

With more leisure time available to greater numbers of people this lake is another instance fortifying the fact that the State is fulfilling a moral obligation by providing wholesome recreational facilities for its citizens.

30.6 Load buses and resume travel to north on Vernon Asbury Road. Topographic rise ahead due to change from the valley train deposits to end moraine.

31.7 Turn left at Asbury Church. Watershed of north branch of Sinking Creek to right.

32.5 Descend onto valley train deposits of the south branch of Buck Creek.

32.7 Turn left on Neer Road. Now traveling along valley train deposits. Hills to the right are gravelly kame deposits formed by meltwater at the edge of the ice.

33.5 Turn left on Mahar Road.

34.0 Small gravel pit to left on curve in road. Stratification and structure would indicate a kame. Broad flat valley of Buck Creek to right. Valley is lined with valley train deposits with higher outwash terraces on each side. Buck Creek, the water source for the city of Springfield, has been inadequate for years. A new site is being planned on the Mad River.

34.2 Rise onto moraine.

34.6 Continue to right on Moorefield-Catawba Road.

35.6 Descend from moraine to outwash. (Kennard outwash of Goldthwait.)

36.4 Descend rather sharply into Buck Creek valley train deposits from outwash. An intermediate plain is visible downstream on left side.

37.0 Rise out of valley onto outwash terrace. Old gravel workings to right.

37.1 Turn right on Highway 4 for one half mile and turn left on Prairie Road. Slow for sharp right turn.

38.2 Exposure of gravels in cut on hill to right.

38.6 Gravelly soil of pasture.

38.8 Turn left on County Line Road.

40.8 Rise onto the Springfield moraine. Moraine is a complicated interbedded till and gravels. Exhibits typical hummocky topography of a moraine.

42.2 Notice eroded pasture area to right with some portions "healed." Meandering stream exhibits good undercut and slip-off slopes.

42.4 Turn right on the Middle Urbana Road. Enter Champaign County.

43.5 For the next .2 of a mile road cut on right exhibits typical interbedded gravels and till of the Springfield moraine. The dark line represents a buried soil profile which is probably the same as the paleosol seen at Stop I.

44.1 Turn left on the Dallas Road.

44.7 Descend the rather sharp ridge off the Springfield moraine. Note the broad expanse (3 miles wide) of the Mad River Valley train. The very small Mad River is most certainly a misfit stream. Notice the levees built up along the tributaries coming off the high moraine. The rather gentle slope leading up to the ridge is probably a bajada caused by the coalescing of alluvial fans.

45.2 Cross Highway 68 continuing on Dallas Road.

46.1 Southern end of Cedar Swamp.

46.8 Turn right.

47.0 Keep right on gravel road.

48.3 Possible STOP VII. Cedar Swamp

Length of time of stop: 10 minutes.

Cedar Swamp is the remnant of a post glacial lake that is now reduced to a strip adjacent to Cedar Run. The Swamp is unique for its unusual flora. See the description of Cedar Swamp under Tour "A." Formerly more extensive, most of it has been cleared for agricultural purposes.

Mad River Water Resources

Most of the Springfield water supply comes from the surface

water of the Buck Creek, supplemented by natural ground water of the gravel deposits and wells. For years shortages of water have occurred in the driest part of the summer. Plans are now underway for a new water system to be located on Mad River at Eagle City.

Geologically, the Mad River Valley offers excellent ground water sources. The valley is lined with 200 to 300 feet of valley-train gravels. The high sustained flow during dry seasons, because of the vast storage of ground water in the gravels of the valley, makes the Mad River one of the best water producers in the state.

Field trip ends at Cedar Swamp. The buses will return to Springfield via Highway 68.

DRIVE CAREFULLY AND ARRIVE HOME SAFELY

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